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Dairy Cows Like Ground Corn in Grass Silage

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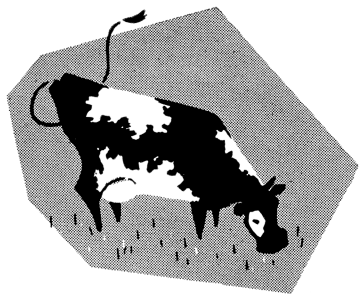
Dairy Cows  Like Ground Corn in Grass Silage

Roughages are a good, and cheap, source of essential nutrients for dairy cows. One possible way to increase roughage consumption is to add some ground corn to grass silage at ensiling or to feed concentrates on top.

by A. R. Porter and R. S. Allen

COWS prefer grass silage that has ground corn added to it during the ensiling process. Cows notice a difference—even though chemical analyses and visual examination show that adding ground corn doesn't make too much difference in the preservation of the silage. Tests show that cows prefer the treated silage to the untreated silage. But concentrates fed on top of the silages erase any differences in preference.

Alfalfa silage with ground corn added at the time of ensiling and alfalfa silage handled in the same manner, but without corn, were compared at the Iowa State College Dairy Farm in 1953. The green material was analyzed at the time of ensiling. Then the untreated and treated silages were analyzed at about 5 and 7 months after ensiling. We kept records of the cows' preferences for the two silages.

The Tests . . .

Between June 3 and June 17, first-cutting alfalfa-bromegrass was chopped in the field and stacked on a concrete slab 100 feet long and 24 feet wide. About 450 tons of green material was distributed as unloaded and packed almost continuously with a four-wheel tractor. The packing was continued for 3 or 4 days afterward, while the pile was settling. The top surface was kept flat. The pile sloped to each end so that tractors with wagons were driven over it in the unloading process.

Half of the stack—a strip 12 feet wide and 100 feet long—had ground ear corn distributed with each load at the rate of 100 pounds per ton. Otherwise, the ensiled grass, the packing and all conditions other than the addition of corn were the same for the two halves of the stack.

A total of 13 samples of the green material was taken at the time it was unloaded on the stack. These samples were analyzed chemically. The results are summarized in table 1.

We took samples of the resulting silage from each half of the stack in early November and again in mid-January. Silage was being fed from one end of the stack and a straight cut taken from top to bottom as it was removed. This exposed a cross section of the stack so we could get samples in various areas. The areas sampled for each half of the stack were: (a) 1 foot below the visibly spoiled material (6 to 8 inches), (b) 6 inches from the bottom of the stack, (c) half way from top sample to bottom sample, and (d) 3 feet on each side of the center sample. Five samples from each half, or a total of

TABLE 1. Chemical Analyses of Forage as Ensiled and as Silage

Material	No. samples	Moisture	Crude protein	Carotene[a]	Essential fatty acids[b]	Butyric acids[c]	pH[d]
		(percent)		(IU/lb.)	(percent, dry matter basis)		
As ensiled	13	76.4	4.2	34,700	1.0	—	—
Silage—no preservative							
Nov. analyses	5	76.9	4.9	24,400	1.1	4.9	5.1
Jan. analyses	5	77.0	4.5	31,800	1.1	3.0	4.8
Average		77.0	4.7	28,100	1.1	3.95	4.95
Silage—added corn							
Nov. analyses	5	75.1	5.2	23,200	1.2	1.7	4.7
Jan. analyses	5	76.4	4.5	31,500	1.3	1.8	4.5
Average		75.8	4.85	27,350	1.25	1.75	4.6

[a]Provitamin A.
[b]Linoleic acid and linolenic acid.
[c]This acid is often associated with strong, unpleasant odor.
[d]A measure of acidity (below pH 7 is acid, above 7 is alkaline).

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10 samples from the areas described, were taken each time and analyzed chemically. The values, too, are summarized in table 1.

What We Found . . .

Carotene values were high in each type of silage — with about the same amount in each type. The carotene content increased between the November and January samples, and both treated and untreated silages were excellent sources of this nutrient. There wasn't as much moisture in the corn-preserved silage as there was in the untreated silage. This was probably due to the corn added.

A similar explanation is offered for the somewhat higher protein and essential-fatty-acid levels in the silage containing corn as a preservative. The apparent increase in protein and essential-fatty-acid levels in each silage when compared to the forage as ensiled may be due to loss of carbohydrate during fermentation. These data indicate that the silages were important sources of the essential fatty acids for cattle.

The silage without any corn preservative had more butyric acid. Butyric acid is partly responsible for the strong, unpleasant odor often associated with certain silages.

The composition of the silage was different at various positions in the stack. In both types of silage, there were increases in moisture, crude protein, carotene, essential fatty acids and butyric acid from top to bottom of the stack. Samples taken on either side of the center sample were similar in composition to the center sample.

Differences couldn't readily be recognized by just looking at the two halves of the stack. Ground corn could be seen in the silage from the treated half, but the silage in the other half otherwise appeared the same.

The Cows' Choice . . .

A group of 12 to 15 dry Ayrshire, Brown Swiss, Guernsey and Holstein cows was sheltered in a shed nearby and was self-fed chopped alfalfa hay from a metal storage bin where it had been dried with a fan. Grass silage from the stack was fed over a fence into wide bunks. We took feeding observations with the treated and the untreated silage periodically for about a month. Weighed amounts of each kind of silage were fed, and the refused portions were weighed back and deducted. Table 2 summarizes the results.

Our first observations showed that each cow consumed an average of 35 pounds of the treated silage and 21 pounds of the untreated silage plus all the hay they wanted, free choice. Later, when no hay was fed, the cows still showed a preference for the treated silage. They ate an average of 47 pounds of treated silage and 33 pounds of the untreated silage. The location of the bunks in which the different silages were placed was changed, but this didn't fool the cows. They made the same choice of treated silage over untreated silage.

When the cows had access to only one kind of silage and known amounts of hay, they showed the same preference by eating more of the treated silage and less hay —47 pounds of treated silage and 10 pounds of hay compared with 36 pounds of untreated silage and 14 pounds of hay.

Why did the cows prefer the treated silage to the untreated silage? The chemical analyses of the two kinds of silage were compared to try to find the answer. The comparison showed three possible reasons: (1) lower moisture content, (2) lower butyric acid content and (3) higher acidity in the treated silage.

Butyric acid has an odor unpleasant to man and may affect the taste of the feed for cows. The added corn might improve the digestibility of the silage by providing more readily available carbohydrates for rumen micro-organisms.

Concentrates . . .

During these observations, no concentrates were fed. When concentrates, at the rate of 4 pounds per cow daily, were spread on top of the silage, total consumption increased, and the preference for the treated silage disappeared. Silage consumption for 2 days averaged over 90 pounds per cow daily when 4 pounds of corn was added and no hay was fed.

When hay was offered in the ration with both treated and untreated silage plus concentrates, the consumption of the two kinds of silage was higher and appetite for hay lower than without the concentrates. In this case, we couldn't find any significant differences in preference between the treated and untreated silage.

In Brief . . .

Under the conditions of this study, with near-optimum moisture content and thorough packing of the green material, the addition of ground corn made little difference in the preservation of the resulting silage—as judged by chemical analyses and visual examination. However, cows showed a distinct preference for the treated silage when compared with the untreated silage fed with and without hay.

This preference was completely erased by the addition of small amounts of concentrates on top of the silage at the time of feeding.

TABLE 2. Consumption of Treated and Untreated Silages With and Without Hay and Grain

Date	No. of cows	Untreated silage	Treated silage	Alfalfa hay	Concentrate fed on silage
			(Average pounds per cow daily)		
12-29-54	12	21	35	as wanted	none
1- 4-54	14	35	44	none	none
1- 7-54	14	31	49	none	none
2-day average		33	46.5		
1-15-54	13	36	none	14	none
1-19-54	15	none	47	10	none
1- 5-54	14	48	45	none	4
1- 6-54	14	48	40	none	4
2-day average		48	42.5		
1-28-54	15	none	58	4	4
1-29-54	15	57	none	5	4